



# Assessing Spatial Biodiversity Dynamics in Kelp Forest Ecosystems using Spaceborne Remote Sensing

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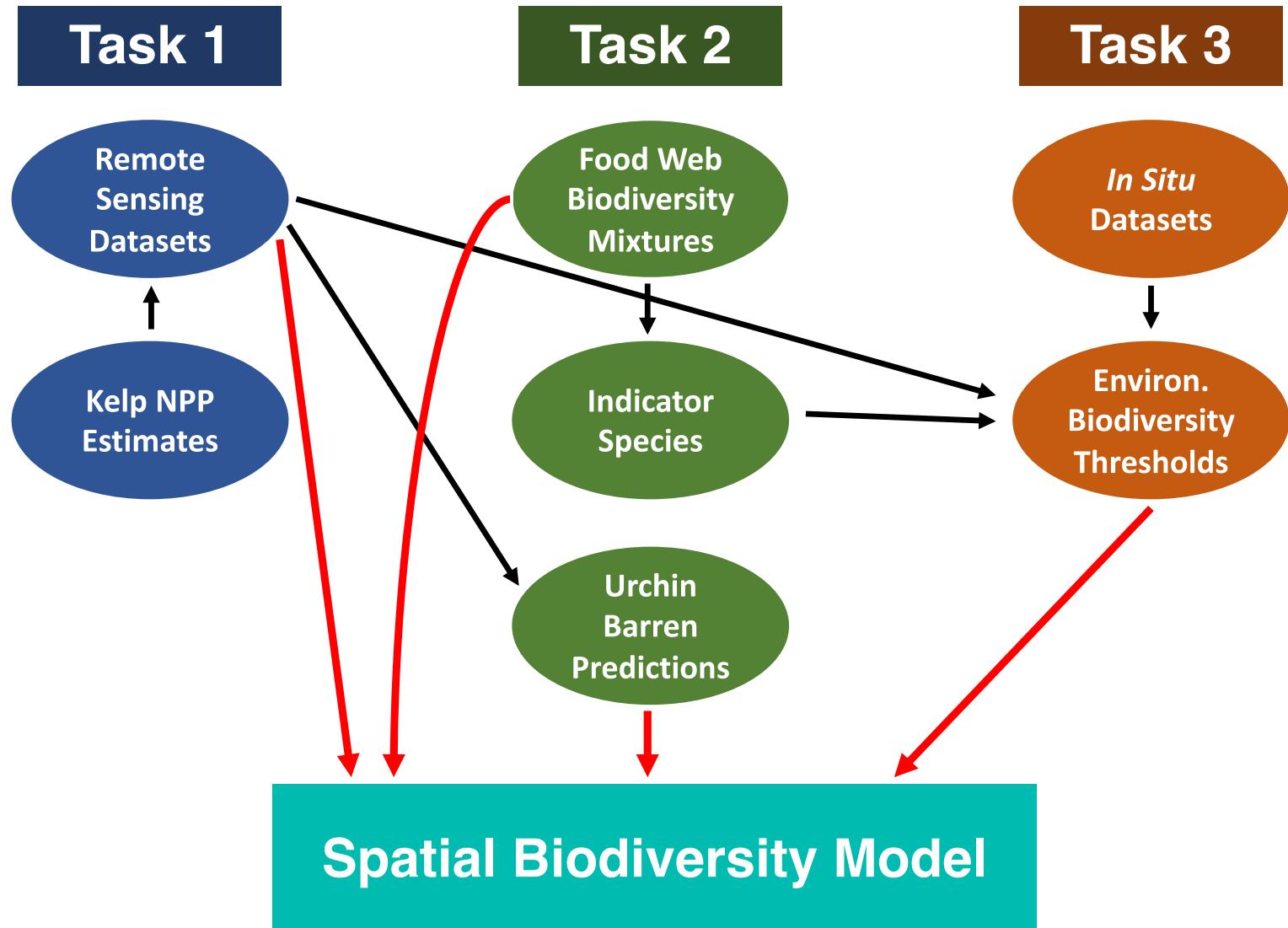
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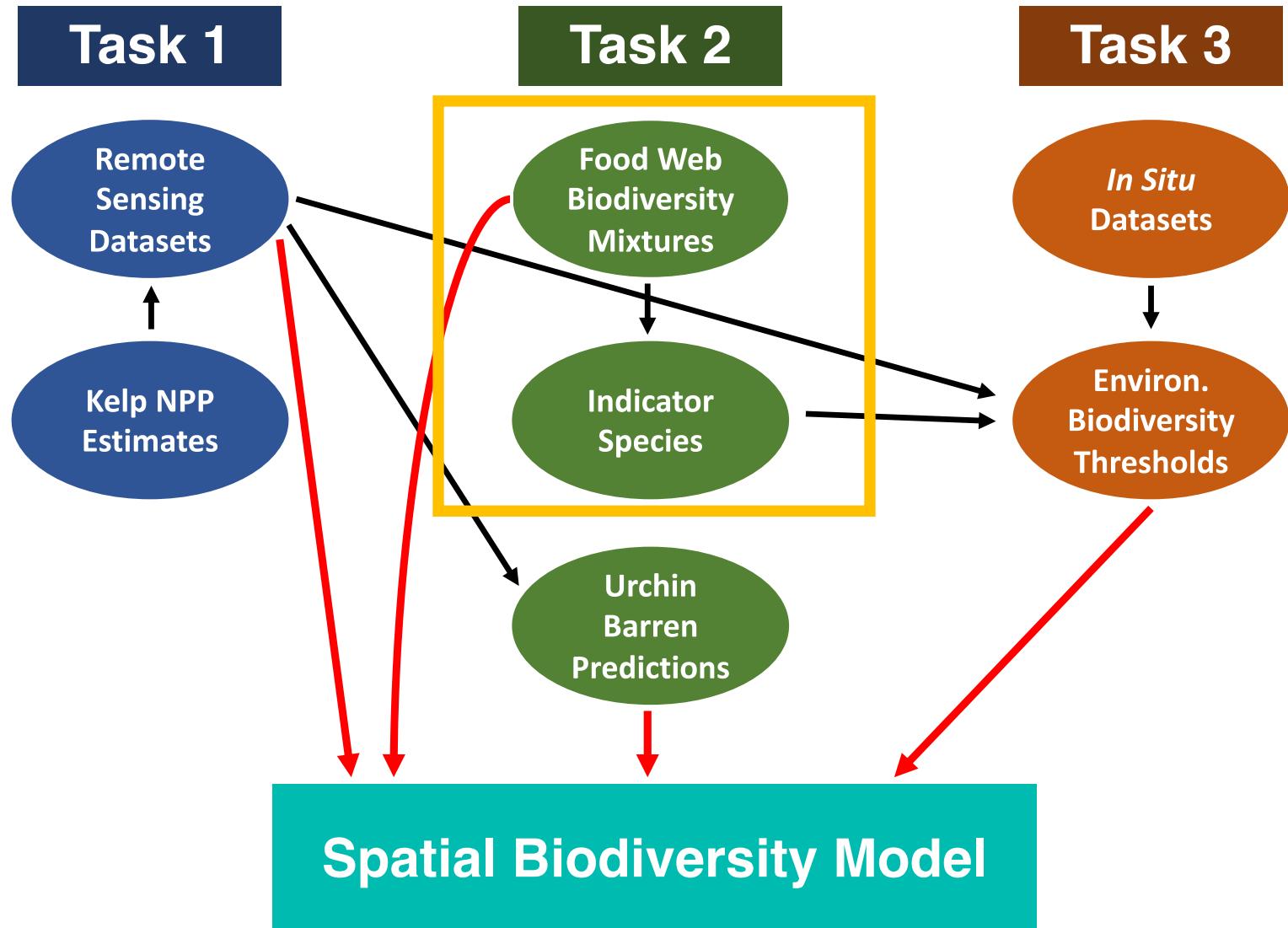
# Overall Project Goals

- Understand the biotic and abiotic drivers of kelp forest community state and develop a spatial model to predict biodiversity dynamics on subtidal rocky reefs in the Southern CA Bight.
- Leverage the strong foundation of prior work in the system together with remote sensing time series, a novel topological food web model, and multidecadal *in situ* biodiversity surveys.

# Overall Project Structure

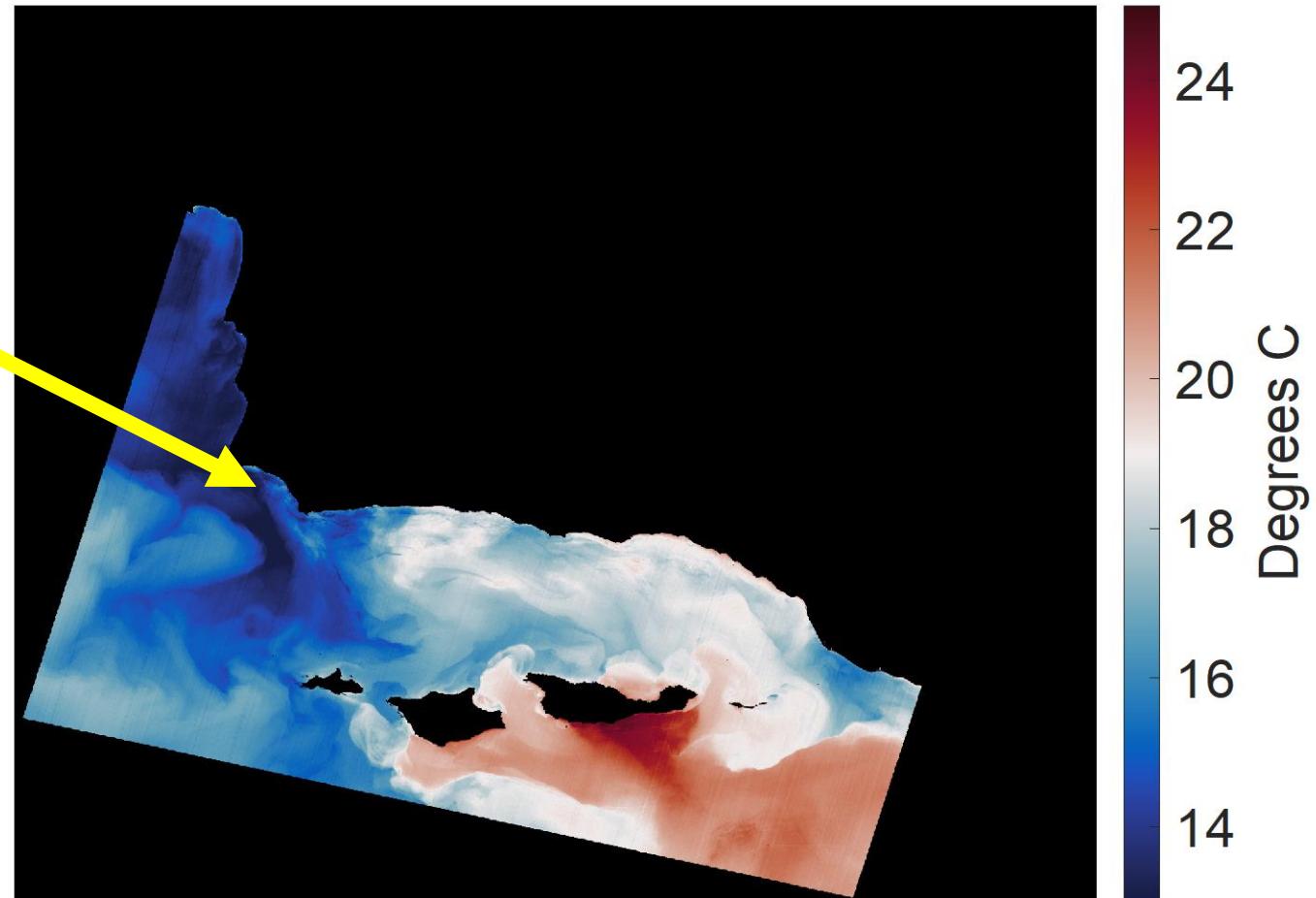


# Overall Project Structure



# Santa Barbara Channel, CA, USA

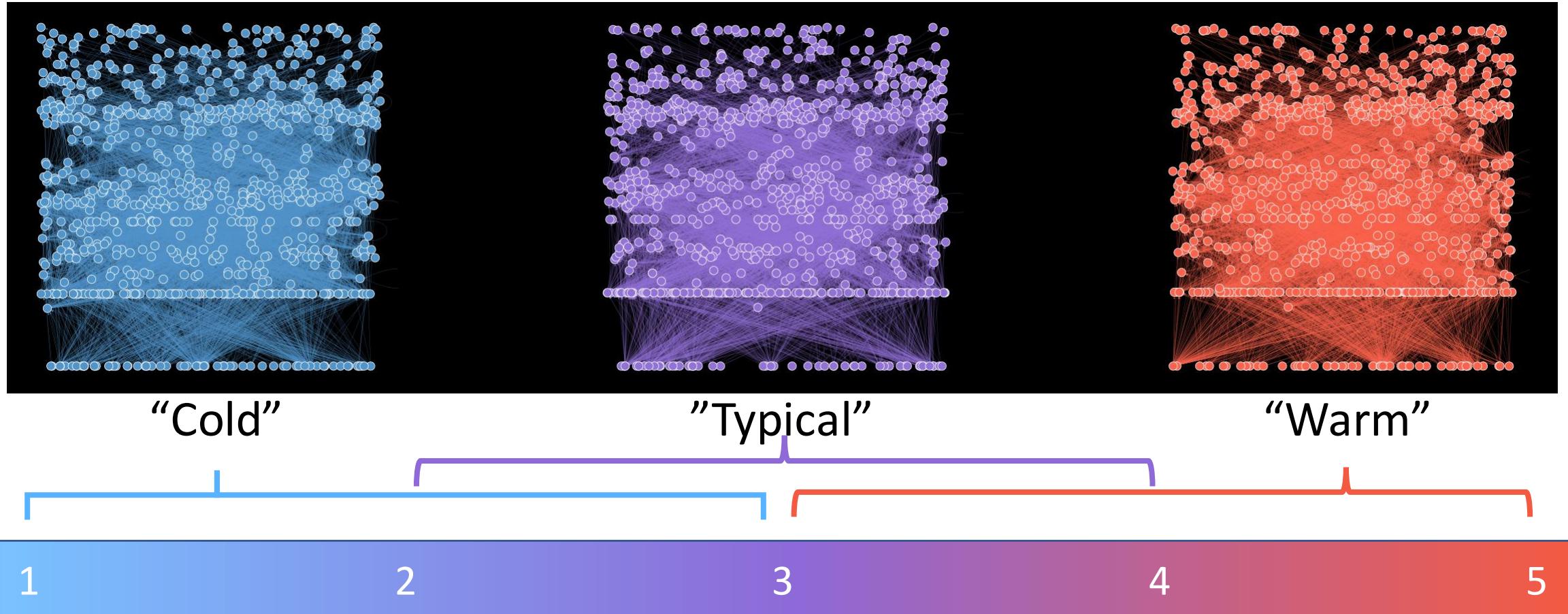
- Transition zone between two floristic provinces
  - Point Conception is key barrier
- Ideal zone to look at shifts in species distributions



Sea surface temperature from Landsat, October 22, 2017

# Kelp forest food webs across thermal zones

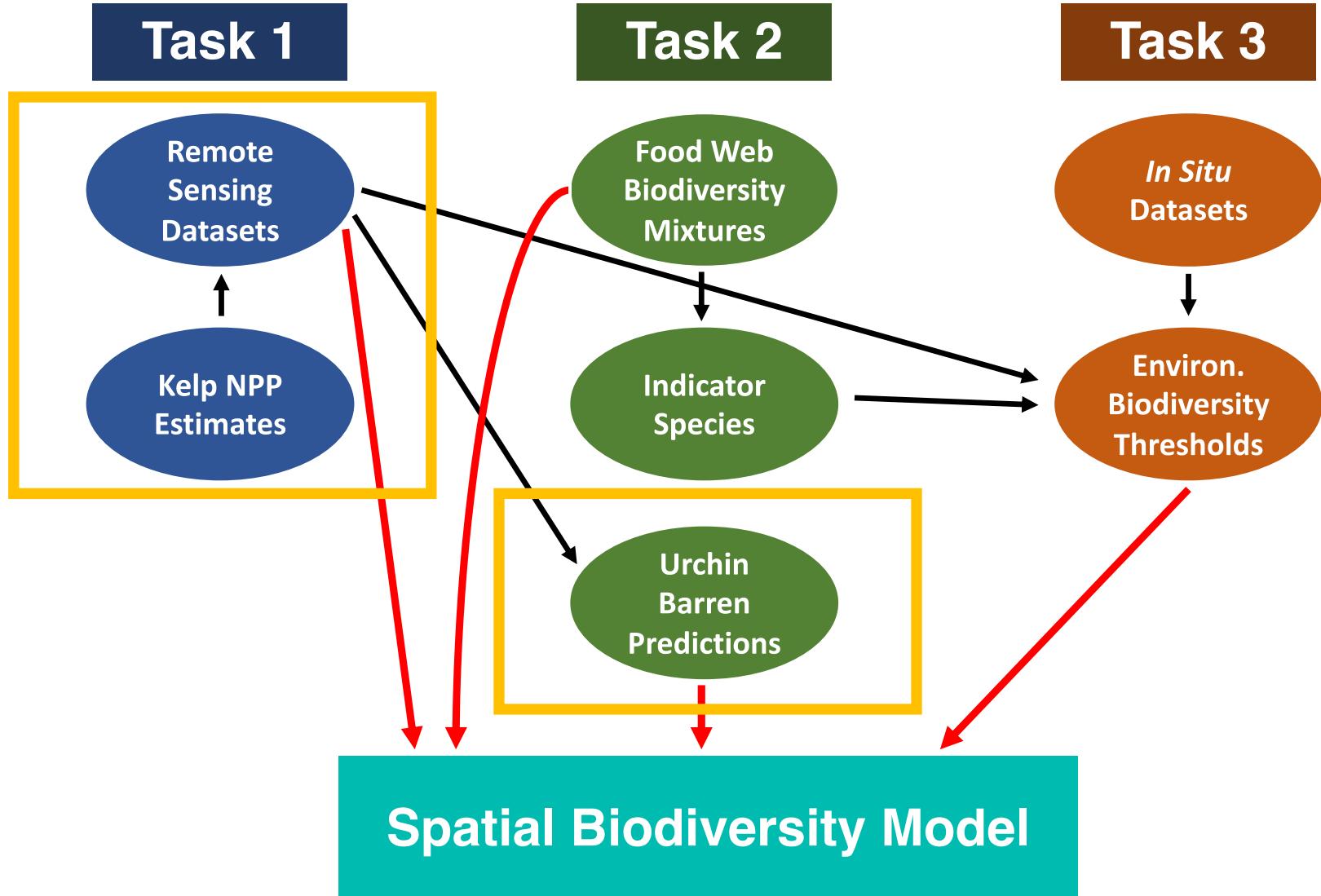
- Used 5 “thermal zones” to construct 3 web versions:

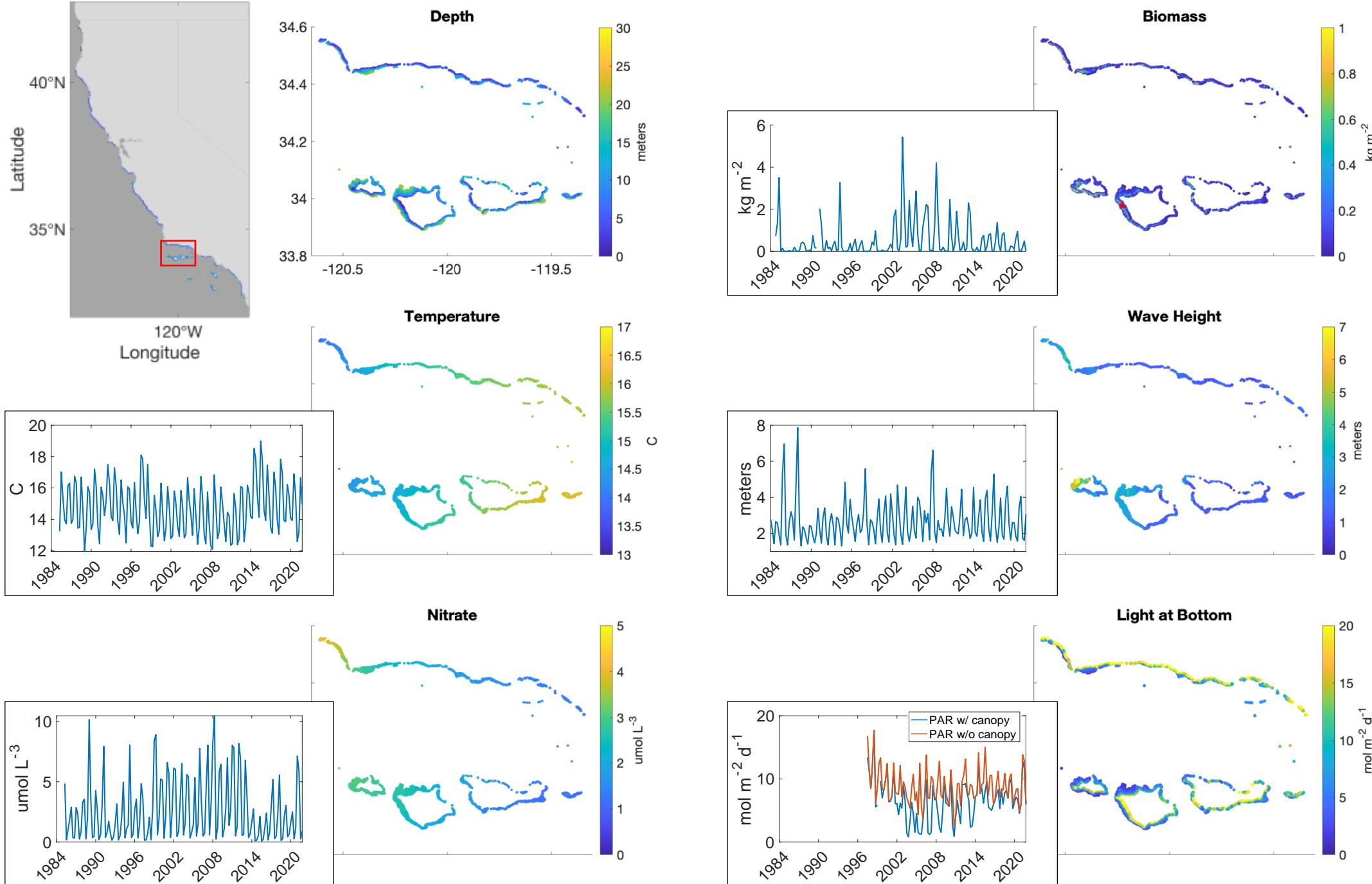


Species with limited thermal data were assumed present in all three versions.

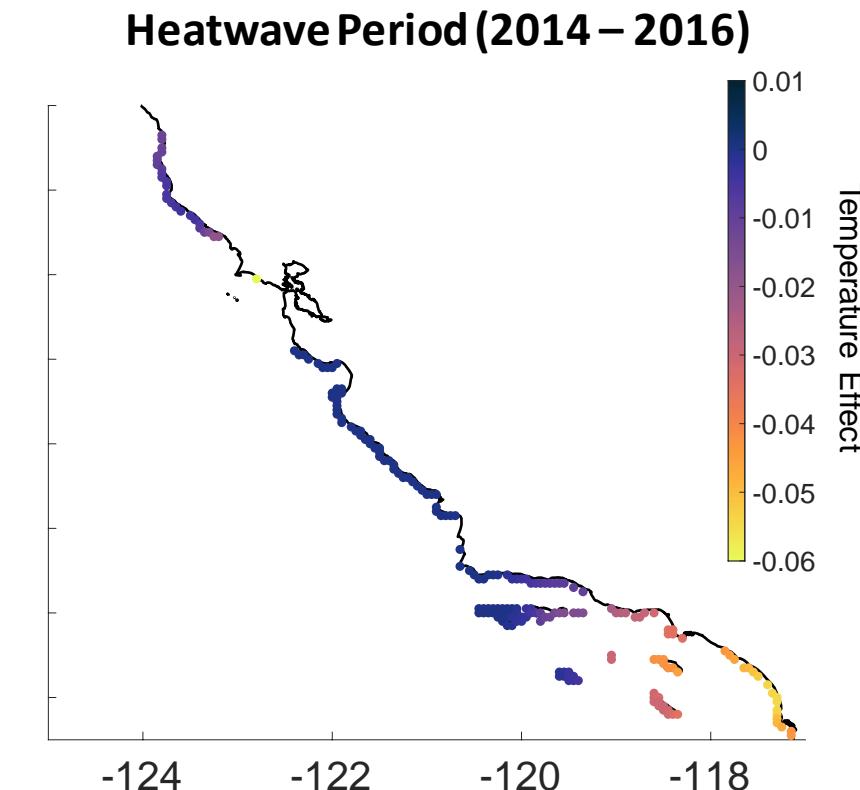
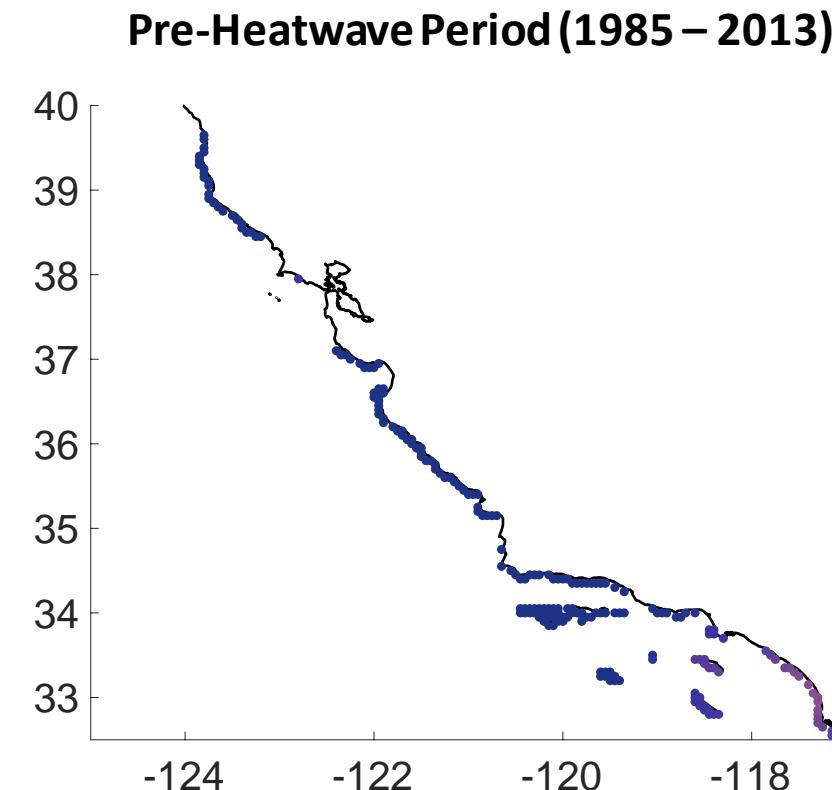
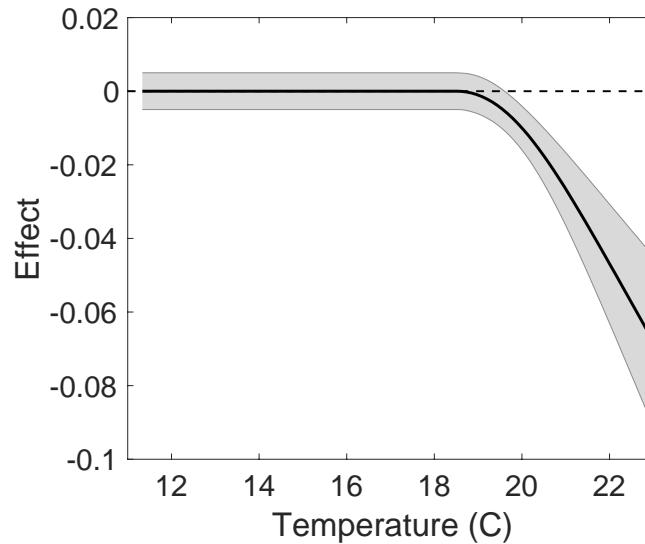
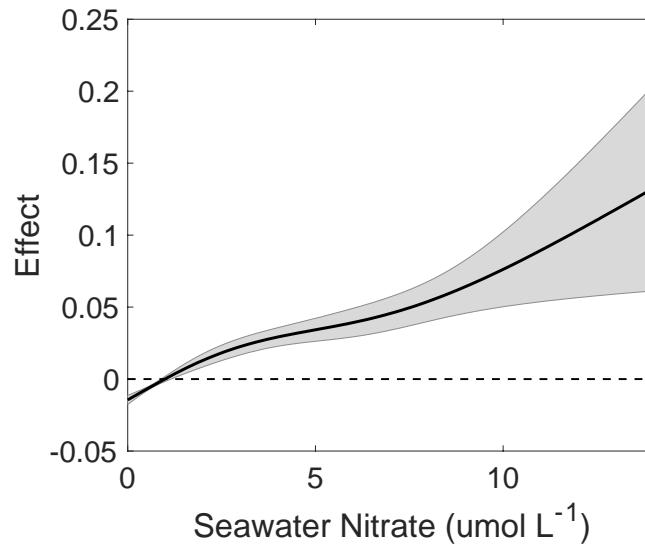
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# Overall Project Structure

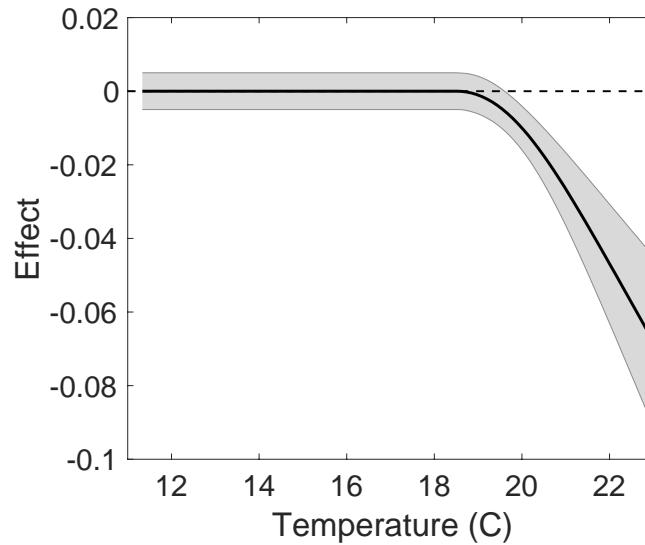
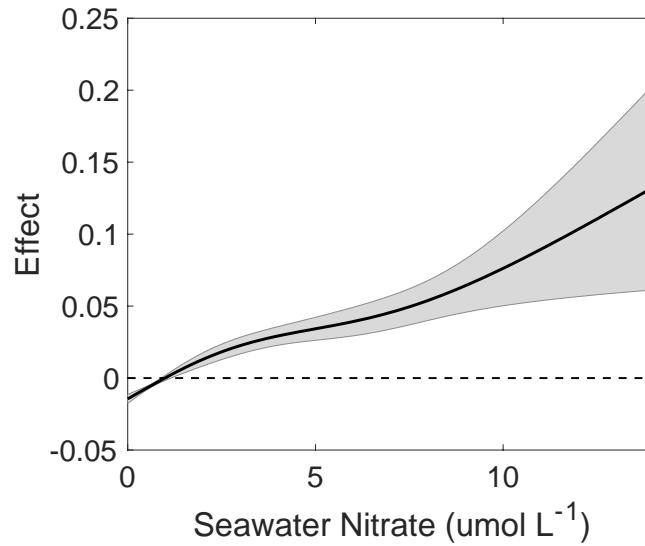




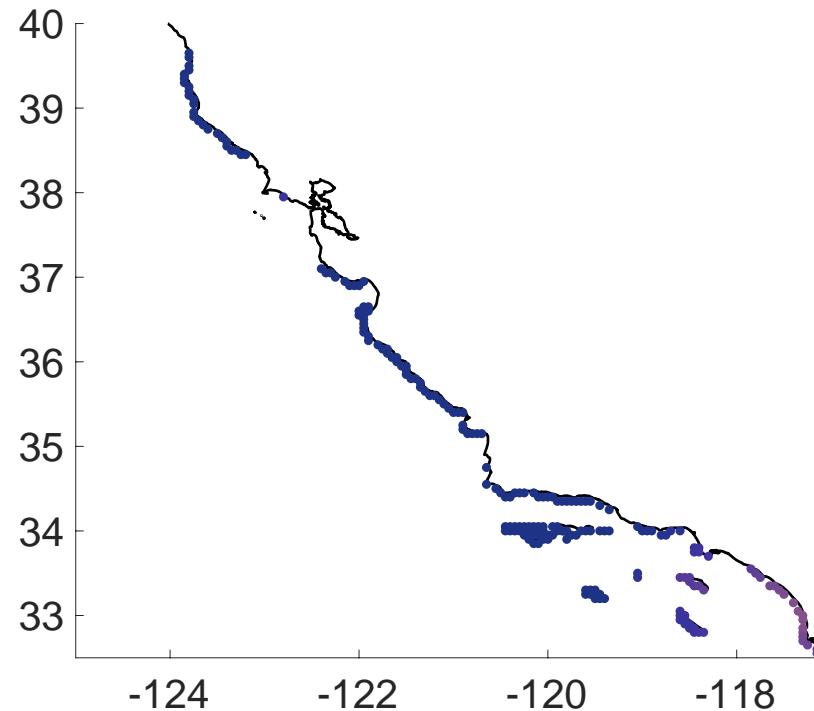
# Abiotic Effects on Kelp Production During Marine Heatwave



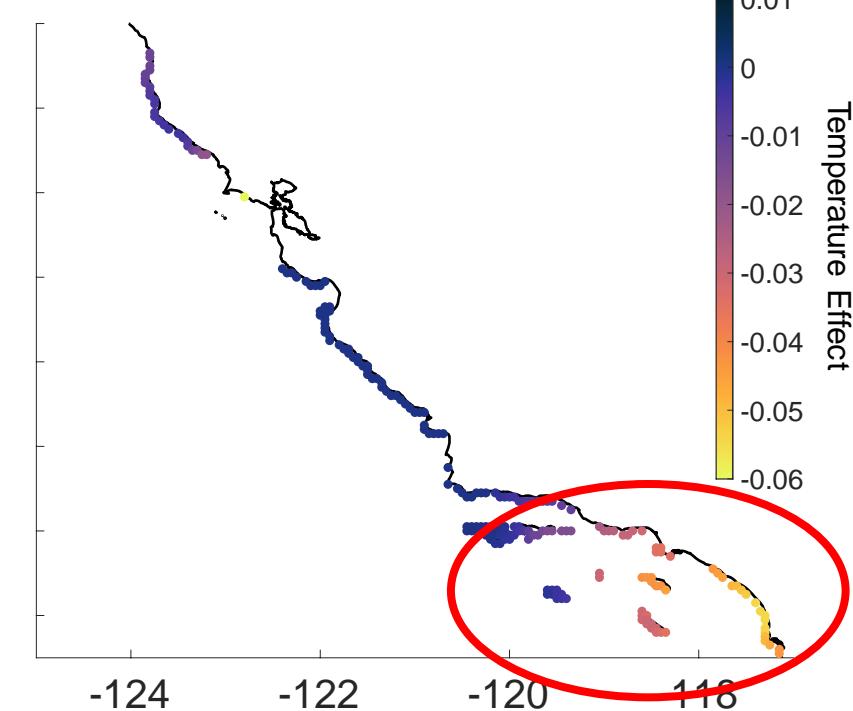
# Abiotic Effects on Kelp Production During Marine Heatwave



Pre-Heatwave Period (1985 – 2013)

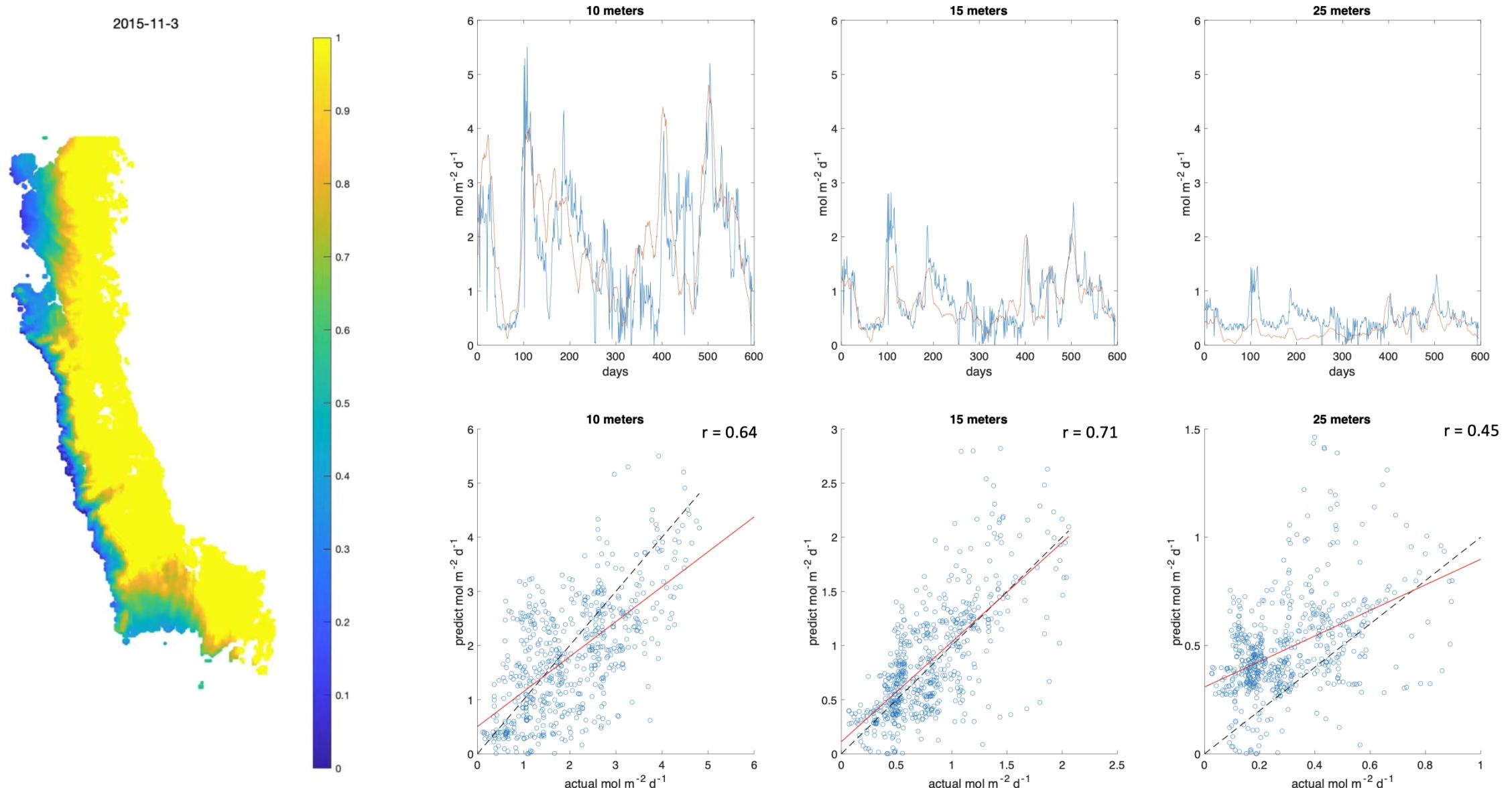


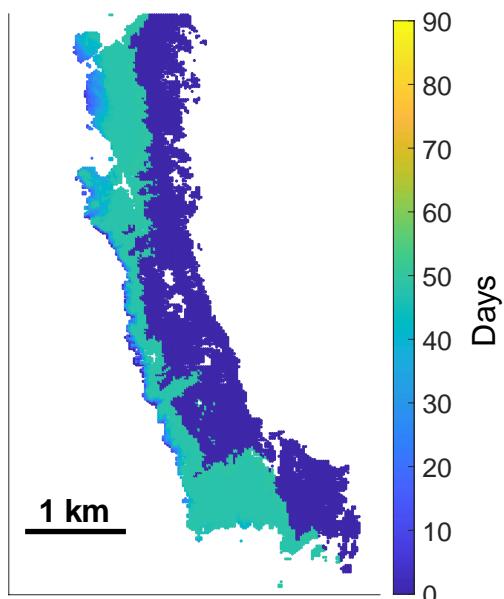
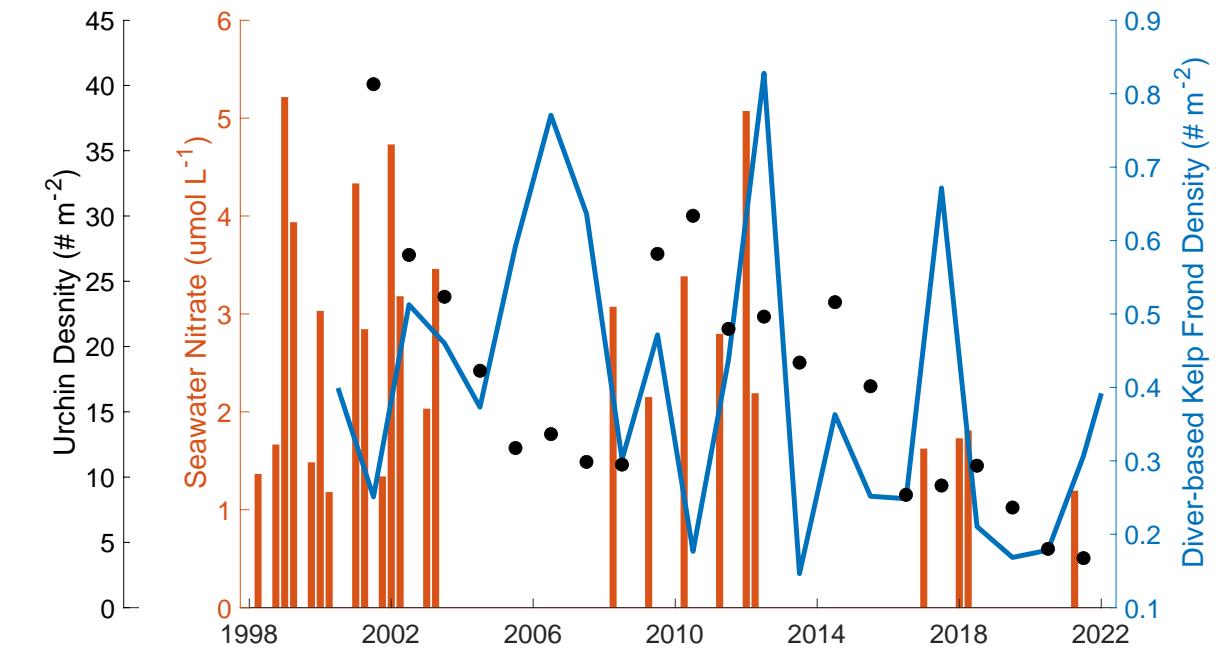
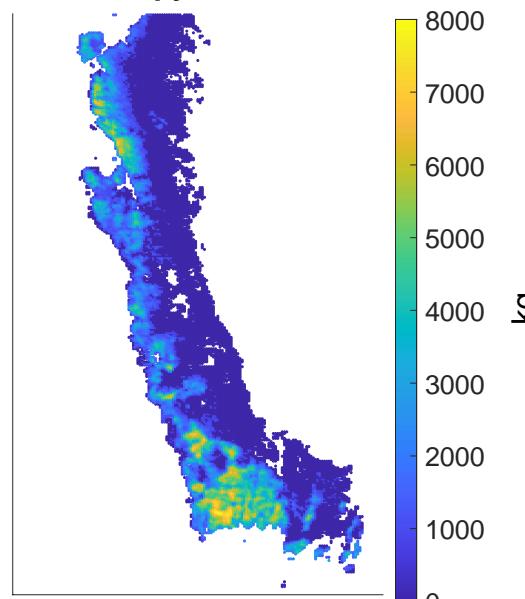
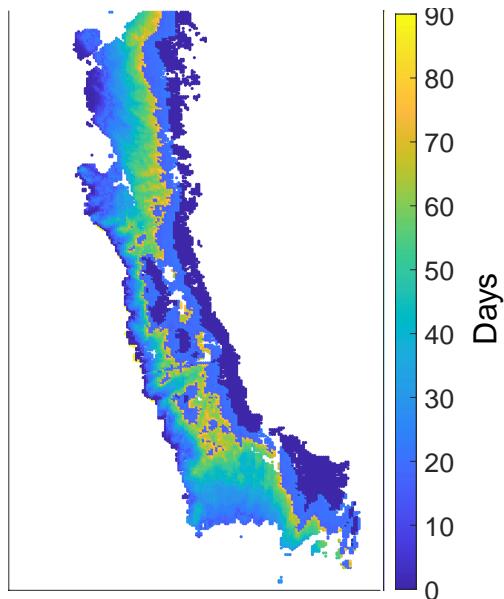
Heatwave Period (2014 – 2016)



Temperature Effect

# Light at Bottom Model for Kelp Recruitment



**Recruitment Window****Canopy Biomass****Recruitment Window****Canopy Biomass**